# STATUTORY DECLARATION

I, Satoko YUGARI, of Taiyo Seimei Otsuka Building 3F, 2-25-1, Kitaotsuka, Toshimaku, Tokyo, 170-0004, Japan, do solemnly and sincerely declare as follows:

I am well acquainted with the English and Japanese languages.

The attached translation is true into the English language of the accompanying certified copy of the document filed in the name of Fuji Photo Film Co., Ltd., in the Japanese Patent Office on 5 June 2000, in respect to an application for Patent.

This 20th day of January 2005,

Satoko Yugari

Satoko YUGARI

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[TITLE OF THE INVENTION] Image synthesizing method and apparatus

[SCOPE OF CLAIMS]

[CLAIM 1] An image synthesizing method for synthesizing an image displayed on display means with a frame of a template image,

characterized in displaying a crop boundary having a corresponding shape to said frame of said template image on an image which is to be synthesized, moving said crop boundary on said image which is to be synthesized so as to place a reference point of said crop boundary on an appropriate point of said image which is to be synthesized, enlarging or reducing said crop boundary around said reference point, while keeping a corresponding shape to said frame of said template image, so as to bound a synthesizing area of said image which is to be synthesized, cropping an image bounded with said crop boundary, and synthesizing said cropped image with said frame of said template image after enlarging or reducing said cropped image according to the size of said frame of said template.

[CLAIM 2] An image synthesizing apparatus being characterized in comprising,

display means for displaying a crop boundary having a corresponding shape to a frame of a template image on an image which is to be synthesized,

operation means for moving said crop boundary on said image

which is to be synthesized so as to place a reference point of said crop boundary on an appropriate point of said image which is to be synthesized, enlarging or reducing said crop boundary around said reference point, while keeping a predetermined proportion of said crop boundary, so as to bound a synthesizing area of said image which is to be synthesized; and

image processing means for cropping an image bounded with said crop boundary and synthesizing said cropped image with said frame of said template image after enlarging or reducing said cropped image according to the size of said frame of said template image.

[CLAIM 3] An image synthesizing apparatus described in claim 2 being characterized in that said crop boundary is composed of said reference point which is placed on an appropriate point of an image which is to be synthesized, an inner boundary which is variable in size according to the size of said image around said reference point while keeping a predetermined proportion, and an outer boundary which is arranged outside of said inner boundary and its size is automatically varied in cooperation with the size change of said inner boundary while keeping an aspect ratio which is equal to that of said inner boundary's dimension, and having a corresponding shape to said frame of said template image.

[DESCRIPTION OF THE INVENTION]

[0001]

[FIELD OF THE INVENTION]

The present invention relates to an image synthesizing

method for designating a cropping area of an image and synthesizing the cropped image, and to an apparatus.

[0002]

[PRIOR ARTS]

An imaging system that takes images in from various media as image data, processes the image data by correcting the image quality or synthesizing with a template before printing is well known. The imaging system consists of image input devices, a computer and a printer. As the image input devices, there are a reflective scanner that reads out images from reflective originals, such as printed photographs or printed matters, a film scanner that reads out images from negative or positive films and a card reader that inputs image data from a memory card which stores image data picked up through an electronic still camera. The computer processes the image data by correcting the image quality or synthesizing with a template. The printer prints out the processed image data.

[0003]

ID photograph is an example of templates' kinds used in an imaging system. Required size and number of ID photographs are defined depending on the needs, such as for the driver's license, passport, state examinations and so on. In the above mentioned imaging system, a number of templates are prepared for the varied kinds of ID photographs. Required number of the ID photograph is printed on a single sheet of recording paper by synthesizing input image with selected template image. Among various kinds of the ID photograph, the ID photograph for the

passport has strict regulations not only of the size of the outline but also of the position and size of a subject's face relative to each edge of the outline of the ID photograph.

[0004]

[PROBLEMS TO BE SOLVED BY THE INVENTION]

In the conventional imaging system, an image which is to be synthesized and a crop boundary which designates the area in the image to synthesize with a template are displayed together on a monitor. In order to designate the area to synthesize, the operator has to repeat the procedures of enlarging and reducing the crop boundary with eye measurement, and moving the crop boundary to determine the position on the image which is to be synthesized. Accordingly, it requires certain skills or several trials to synthesize the image with the template image with an appropriate area and size, and thus this operation has been time consuming.

[0005]

The present invention is to solve the above mentioned problems and aims to facilitate synthesizing images with template images for ID photographs and the like.

[0006]

[MEANS FOR SOLVING THE PROBLEMS]

In order to solve the problems mentioned above, in an image synthesizing method of the present invention, a crop boundary having a corresponding shape to a frame of a selected template image is displayed on an image which is to be synthesized, and the crop boundary is moved on the image which is to be synthesized

so as to place a reference point of the crop boundary on an appropriate point of the image which is to be synthesized. The crop boundary is enlarged or reduced around the reference point, while keeping a corresponding shape to the template image, so as to bound a synthesizing area of the image which is to be synthesized. An image bounded with the crop boundary is cropped, and the cropped image is synthesized with the frame of the template image after being enlarged or reduced according to the size of the frame of the template image.

[0007]

Additionally, the image synthesizing apparatus of the present invention is composed of display means for displaying the crop boundary having a corresponding shape to the frame of the template image on the image which is to be synthesized, operation means for moving the crop boundary on the image which is to be synthesized so as to place a reference point of the crop boundary on an appropriate point of the image which is to be synthesized, enlarging or reducing the crop boundary around the reference point, while keeping a predetermined proportion of the crop boundary, so as to bound a synthesizing area of the image which is to be synthesized, and image processing means for cropping an image bounded with the crop boundary and synthesizing the cropped image with the frame of the template image after enlarging or reducing the cropped image according to the size of the frame of the template image.

[0008]

The crop boundary is composed of the reference point which

is placed on an appropriate point on an image to be synthesized, an inner boundary which is variable in size according to the size of the image around the reference point while keeping a predetermined proportion, and an outer boundary which is arranged outside of the inner boundary and its size is automatically varied in cooperation with the size change of the inner boundary while keeping an aspect ratio which is equal to the inner boundary's dimension, and having a corresponding shape to the frame of the template image.

[0009]

[EMBODIEMENTS OF THE INVENTION]

Fig. 1 is a block diagram illustrating an imaging system according to an embodiment of the present invention. An imaging system 10 consists of a personal computer (hereinafter, referred to as PASOKON) 12, a monitor 11, which is connected to the PASOKON 12, as a display device, and a card reader 13, a reflective scanner 14 and a film scanner 15 as image input devices, and a printer 16 which records the image that is input through the respective image input devices 13 to 15 and processed in the PASOKON 12 on recording paper. The printer 16 is, for instance, of a type that uses a heat-developing photosensitive material.

[0010]

The PASOKON 12 consists of a CPU 18, a ROM 19, a RAM 20, a hard disc drive (HDD) 21, a file reader 22 that is comprised of, for instance, a floppy disc drive, an image data converter 23 and an image synthesizing section 24. The file reader 22

may read out the image data from a floppy disc. In that case, the file reader 22 is used as an image input device.

[0011]

A keyboard 26, a mouse 27 and a control panel 28 are connected to the exterior of the PASOKON 12. The keyboard 26 is used for installing software-programs in the PASOKON 12, setting up various parameters in the PASOKON 12, or for maintenance of the PASOKON 12. The control panel 28 is provided with operation buttons which are used specifically for controlling the imaging system 10. The mouse 27 and the control panel 28 are used for the imaging and processing.

[0012]

The card reader 13, the reflective scanner 14 and the film scanner 15 are connected in cascade to the PASOKON 12 through a SCSI interface 30 that is provided with the PASOKON 12. After a memory card is connected, the card reader 13 reads out image data, which is picked up and recorded by an electronic still camera, from the memory card.

[0013]

The reflective scanner 14 is for reading out images from reflective originals, such as printed photographs, instant photographs and printed matters. As the reflective scanner 14, for instance, a flatbed scanner that reads out an image from the entire surface of the reflective original by scanning a line sensor across a reflective original as placed on a reading stage is used. The film scanner 15 is for reading out an image from light-permeable materials, such as negative and positive photo

films, and in the case of reading the image from the negative photo film, the read out image is converted into a positive image and input to the PASOKON 12.

[0014]

The PASOKON 12 is connected to a network 33, such as a LAN (Local Area Network) or the Internet. Through the network 33, the imaging system 10 can share the same data with and cooperate with other imaging systems installed in a photo-lab, or process image data sent from clients through communication lines. For sending and receiving images through the Internet, the image is ciphered so that the image can be accessed only by those who have privileges. In ciphering, privileges are classified in a hierarchy system such that the right to access is given to those belonging to the designated and upper.

[0015]

The image data input through the respective image input devices 13 to 15 is sent to the image data converter 23. The image data converter 23 consists of a color correction circuit and a gradation processing circuit. The color correction circuit determines the color balance of the input image by carrying out $\gamma$-correction on each RGB color signal of the image data with correction coefficients that correspond to the respective image input devices 13 to 15. On determining the color balance, each spectral characteristic varies among the image input devices 13 to 15 is taken into consideration.

[0016]

The gradation processing circuit corrects gradation of the

image data by applying LUTs which are prepared to correspond with the respective image input devices 13 to 15, such that an appropriate gradation is acquired by printing with printer 16 of the imaging system 10. After correcting the gradation, the gradation processing circuit converts the image data into YMC form (masking), and records the converted image on the RAM 20.

[0017]

The different kinds of reflective originals, including printed photographs, printed matters, color prints and instant photographs, use different color materials. Therefore, the reflective scanner 14 is provided with a number of different LUTs in accordance with a variety of color materials. By designating the kind of the reflective original the reflective scanner 14 is going to scan, an appropriate LUT for the color material used in the designated reflective original is used for the gradation correction. The film scanner 15 is also provided with two types of LUTs: one for the negative film and the other for the positive film.

[0018]

Moreover, the film scanner 15 is provided with two kinds of scan mode. One is a pre-scan mode used for inputting an image to the PASOKON 12 and displaying the image. The other is a main scan mode used for printing the image. In the pre-scan mode, the image data converter 23 corrects color and gradation of the input image data, and the results of correction are reflected in the image data displayed on the monitor 11. In the main scan mode, correction parameters applied to the image data during

the pre-scan mode are transferred to an image data converter in the film scanner 15. Then, the γ-conversion and the gradation correction is performed on the image data in the film scanner 15 based on the correction parameters, then the image data is bypassed the image data converter 23 of the PASOKON 12 and recorded on the RAM 20.

[0019]

The image synthesizing section 24 performs a variety of image processing operations, such as magnification changing of a selected image, cropping and synthesizing with a template.

[0020]

A image processing software for image processing and image synthesizing is installed in the PASOKON 12. The image data converter 23 and the image synthesizing section 24 are activated by starting up the image processing software. As the image processing software is started up, a control screen 35 of the image processing software is displayed on the monitor 11, as shown in Fig. 2. The operator operates each functional button on the control screen 35 by use of the mouse 27 or the control panel 28 so as to run the imaging system 10.

[0021]

The control screen 35 of the image processing software is a fixed multi-window type that adopts Graphical user interface (GUI) in a number of working areas whose positions and sizes are fixed. The control screen 35 consists of a largest main display area 37, first and second sub display areas 38 and 39 and a main control command display area 40 which are located

on the right of the main display area 37, an image quality display area 41 which is located on the right of these areas 38 to 40, a message display area 42 and a menu selection display area 43 which are located below the control screen 35. Additionally, a movable cursor 44, which is controlled by the mouse 27 or the control panel 28, is also displayed on the control screen 35.

[0022]

The main display area 37 is a work area where an image 80 which is to be synthesized is displayed large for image processing, such as modifying or correcting the image or the image quality, and synthesizing the image with other images. The first sub display area 38 is a preview display area for displaying an image simulating a printed condition in a reduced size. For example, in the case of selecting a template for printing eight frames of an identical image on a sheet of recording paper, a corresponding layout image 46 that represents the image synthesized with respective frames in proper position and reduced in size is displayed on the first sub display area 38 in a reduced size.

[0023]

The first sub display area 38 enables the operator to have an accurate grasp of the whole printable image at all times, therefore the operator can always confirm which template is presently selected. This configuration is convenient especially when different images are to be synthesized by pasting them in a template that has a number of frames and to be printed because it allows the operator to confirm which image

is synthesized with which frame immediately.

[0024]

The second sub display area 39 is a thumbnail display area. When a number of image data are read in, for example three frames of these image data are arranged vertically as thumbnails 48 on the second sub display area 39. Upon selecting any image for synthesizing or printing among the thumbnails 48 by use of the mouse 27 or the control panel 28, the selected image 80 which is to be synthesized is displayed on the main display area 37.

[0025]

As images are input from the reflective scanner 14, one thumbnail is generally displayed. On the other hand, as images are input from the card reader 13, there are often three ore more frames of thumbnails 48 that are to be displayed. In this case, a pair of scroll buttons 49 is displayed below the thumbnails display, and the operator can check a number of input images continuously by operating the scroll buttons 49 with the mouse 27 and the like.

[0026]

The main control command display area 40 is provided with a selection button 51, a pasting button 52 and a print button 53. The selection button 51 is used for selecting the image for synthesizing among the thumbnails 48 displayed on the second sub display area 39. The selection button 51 is displayed as "READ-IN" when no image is read in and operated for reading images in from the card reader 13, the reflective scanner 14 or the film scanner 15. As for the reflective scanner 14, it

generally inputs a single image, therefore it is efficient for the image that is input from the reflective scanner 14 to be automatically selected as the image for synthesizing, without operating the selection button 51.

[0027]

The pasting button 60 is operated to synthesize the selected image 80 which is to be synthesized by pasting the whole image or the cropped image in a template. The print button 61 is operated to activate the printer 16 to print an image after the image is processed by quality control, image synthesizing or the like.

[0028]

The image quality control area 41 is provided with control buttons and control sliders that are used for the manual image quality control, such as density correction 55, color correction 56, sharpness 57, soft focus 58 and moiré adjustment 59. The operator places the cursor 44 on the control buttons by operating the mouse 27, then presses (clicks) the button of the mouse 27, thereby the control buttons are operated. The operator grabs the small knobs on the scales of the control sliders with the moue 27, and then moves the knobs to appropriate positions, thereby the control sliders are operated.

[0029]

Additionally, an image quality control reset button 60 for resetting the previously setup values for the image quality control, a register button 61 for registering the setup values for the image quality control and a call up button 62 for calling

up the registered setup values are provided below the image quality control area 41. The call up button 62 allows the operator to use the setup values repeatedly after once they are setup, and thus improves work efficiency.

[0030]

Below the buttons related to the image quality control, an image rotating button 64 for rotating the image 90 degrees on the main display area 37, an image reverse button 65 for reversing the image against the vertical axis, a free cropping button 66 for changing the aspect ratio of a crop boundary, a boundary rotating button 67 for rotating the crop boundary 90 degrees and a reset button 68 for canceling designation of a cropping area by the crop boundary are provided.

[0031]

The menu selection display area 43 is provided with six operation buttons which are a menu button 70, an input selection button 71, an input size button 72, a print size button 73, a zoom button 74 and a print number button 75. For example, upon clicking on the menu button 70 with the mouse 27, a list of plural menu titles displayed extending from the menu button 70. While the list of menu titles is displayed, the operator selects one menu title by using the mouse 27. Then, the image processing software is switched to a job mode corresponding to the selected menu.

[0032]

As examples of the modes selectable by the menu button 70, there are a digital camera index mode, a digital camera

processing-printing mode, an album mounting mode and an ID photograph producing mode.

[0033]

The digital camera index mode is selected to produce an index print, wherein all images which are recorded on a memory card being connected to the card reader 13 are reduced in size and arranged in a matrix. For this mode, a number of templates that has different number of frames are prepared, therefore proper template is selected according to the number of images to be contained in an index print. The digital camera index mode does not have a repeat recording function for pasting the identical image in plural frames.

[0034]

For the digital camera processing-printing mode, various templates are prepared according to the size of the recording paper. For A4 size recording paper, a template with four frames is used and for A5 size recording paper, a template with two frames is used. Additionally, the digital camera processing-printing mode does not have the repeat recording function.

[0035]

The album mounting mode is, for instance, for printing a number of images on a recording sheet such that the images are arranged just like mounted on an album, therefore a file of the printed recording paper serves directly as an album. Some templates are prepared for this mode. For instance, there are a template for arranging same sized four images on one sheet

of recording paper, a template for arranging one large image and two small images (three as a total) on one sheet and a template for arranging two large images on one sheet. With the ID photograph producing mode, ID photographs that are attached to various kinds of official application papers can be produced.

[0036]

The input selection button 71 is operated to select the device for inputting the image data. Upon operating the input selection button 71 with the mouse 27, a list of input devices is displayed extending from the input selection button 71. The input devices selectable by the input selection button 71 are those connected to the imaging system 10. For example, there are the card reader 13, the reflective scanner 14, the film scanner 15 and the file reader 22, such as a floppy disk drive.

[0037]

When the reflective scanner 14 or the film scanner 15 is selected by the input selection button 71, a list of kinds of the original images to scan is listed. The examples of the displayed kinds are a printed photograph, a printed matter, a color print, an instant photograph, a negative photo film, a positive photo film, and so forth. The operator operates the mouse 27 to select one that corresponds to the kind of the original among the list. Then, the color correction circuit and the gradation processing circuit of the image data converter 23 carry out proper corrections for the image data with regard to color materials used in the selected kind of original when images are input. Additionally, it is possible to register

other kinds of originals besides those listed above.

[0038]

The input size button 72 is used for entering the size of an original when the original is scanned through the reflective scanner 14. A list of size options for the original is displayed upon clicking on the input size button 72 with the mouse 27 likewise other operation buttons. By selecting proper size for the original among the list, the range of the original that is to be scanned through the reflective scanner 14 is determined.

[0039]

The print size button 73 is operated for selecting the sheet size of recording paper for printing, or for selecting a template. Upon clicking on the print size button 73 with the mouse 27, a list of paper size options and template options is displayed, then the operator selects proper one among the list.

[0040]

There are many kinds of templates stored in the imaging system 10, therefore the displayed list of template options extending from the print size button 73 is switched over according to the mode selected by the menu button 70. For instance, those templates that have many frames and used for the index printing are listed when the digital camera index mode is selected, whereas those templates for the driver's license, passport and so on are listed when the ID photograph producing mode is selected.

[0041]

Besides selecting the template with the list from the print

size button 73, the template can be selected more visually with icons 77a to 77d displayed on the main display area 37, as shown in Fig. 3, wherein each icon shows an image of one template in a reduced size. Four of the icons 77 are displayed on the main display area 37 at once, however when there are more than four templates for the selected mode, page scrolling buttons 78a and 78b are displayed below the main display area 37. The operator can check all of the templates in turns by scrolling the main display 37 by operating the page scrolling buttons 78a and 78b with the mouse 27.

[0042]

The zoom button 74 is used for zooming in and out the image data displayed on the main display area 37. The print number button 75 is for designating the number of copies to print. These operation buttons 70 to 75 are each divided into upper and lower halves. The lower half indicates the menu title and the upper half indicates the presently selected option.

[0043]

The message display area 42 displays messages relating to the presently executed operation or job, information on the operation or the job that can be executed next, or hints for the next operation. Besides these messages, the message display area 42 also displays error messages when operation errors occur.

[0044]

A first display interchange button 82 is provided between the main display area 37 and the first sub display area 38, and

a second display interchange button 83 is provided between the main display area 37 and the second sub display area 39. Both the first and second display interchange buttons 82 and 83 have a pair of right and left arrows thereon. For instance, when the first display interchange button 82 is operated in a condition where the image 80 which is to be synthesized is displayed on the main display area 37 and the layout image 46 is displayed on the first sub display area 38, as shown in Fig. 2, the image 80 which is to be synthesized is then displayed in a reduced size on the first sub display area 38, and the layout image 46 is displayed in an enlarged size on the main display area 37, as shown in Fig. 4.

[0045]

In the same way, when the second display interchange button 83 is operated, the displayed contents are interchanged between the main display area 37 and the second sub display area 39, as shown in Fig. 5. When the image is interchanged from the second sub display area 39 to the main display area 37, six frames of the thumbnails 48a to 48f are displayed at once on the main display area 37, making full use of the large main display area 37. In the case where there are more than six images which are to be displayed as thumbnails, a pair of page scrolling buttons 85 is displayed below the main display area 37. Thus, with the first and second display interchange buttons 82 and 83, the small images displayed on the first or the second sub display area 38 or 39 can be readily displayed in an enlarged size on the main display area 37, therefore these buttons 82 and 83 are

very convenient for the sake of confirming the details of the images.

[0046]

The image processing software used for the conventional imaging system adopts a floating multi-window type control screen where a number of display areas are displayed with overlapping each other. The floating multi-window type control screen is not handy since it requires to switch the windows one another in order to view the lower windows, and also requires to adjust the sizes and positions of the windows and rearrange them by operating the mouse in order to view all of the windows at once. On the contrary, in a fixed multi-window type control screen 35 adopted for the image processing software according to the present embodiment, the respective positions of the display areas 37 to 43 are fixed. Therefore, all of the display areas are viewed at any time without troublesome operations. Furthermore, the first and second display interchange button 82 and 83 make it easier to enlarge or reduce the size of the display area as compared with the floating multi-window type control screen.

[0047]

Fig. 6 is an explanatory diagram illustrating examples of templates available in the "ID photograph producing mode". Any of the templates 88 to 93 are designated to use the "A5-size" recording paper. The template 88 for the disaster prevention manager's license shown in Fig. 6 (A) is defined as: the size of one frame, 88a is "5.6 cm × 3.6 cm", the number of different

synthesizable images is "2" and the number of the frames for the same image is "4" (2 different kinds, 4 frames each). The template 89 for the resume or national public servant's examination and the template 90 for the car maintenance engineer's license, shown in Fig. 6 (B) and (C) respectively are defined as: the number of different synthesizable image is "1" and the number of the frames is "4" (1 different kind, 4 frames), and the size of the frames 89a and 90a are "5.6 cm × 4.6 cm" and "6.1 cm × 4.6 cm", respectively.

[0048]

The template 91 for the visa or driver's license shown in Fig. 6 (D) is defined to have 2 different kinds of images and 3 frames each. Among three frames for pasting the same image, one frame differs from other two in size. The sizes of the frames 91a and 91b of the template 91 are "5.4 cm × 5.4 cm" and "3.5 cm × 3.0 cm", respectively. The template 92 for the first-class architect's license shown in Fig. 6 (E) is defined to have 1 different kind of image and 8 frames, and the size of the frame 92a is "4.5 cm × 3.5 cm.

[0049]

The template 93 for the passport shown in Fig. 6 (F) is defined to have 1 different kind of image and 8 frames, and the size of the frame 93a is "5.0 cm × 4.0 cm". Besides the templates illustrated in Figs. (A) to (F), many other templates are stored in the PASOKON 12. Additionally, it is possible to use A5-wide recording paper which is wider than A5-size, and some templates for the A5-wide are also prepared.

[0050]

As shown in Fig. 7 (A), the size of the outline of the ID photograph 95 for the passport is "T × W = 4.5 cm × 3.5 cm". The size and the position of a subject relative to each edge of the outline of the ID photograph are defined as follows. Concretely, S1 which is the length from upper edge of the ID photograph 95 to the top of the subject's head is 7mm, S2 which is the vertical length of the subject's head is 27 ± 2 mm and Wh which is the length from the center of the head to each side edge of the ID photograph 95 is 17 ± 2mm.

[0051]

The size of the frame 93a of the template 93 is defined to be 5 mm larger, in both length and width, as compared with the actual size of the ID photograph 95 for the passport so that each frame can be cut out of the recording paper within the printed area such that the ID photograph does not contain margins on its outline.

[0052]

With the conventional imaging system, it has been very difficult to synthesize the image with the template for the passport ID photographs in designated size and proper position, and certain skills or several trials have been required. Therefore, its procedure has been inefficient. On the contrary, the imaging system 10 according to the present embodiment makes it easy to produce the ID photograph 95 for the passport that has strict regulations of the size of the subject and the position of the top of the subject's head.

[0053]

As mentioned above, when the template 93 for the passport ID photograph is selected by operating the print size button 73, a rectangular crop boundary 98 for designating the area to synthesize is displayed on the main display area 37, as shown in Fig. 8 (A). The crop boundary 98 is comprised of an outer boundary 98a having a corresponding shape to the outline of the ID photograph 95 for the passport, an inner boundary 98d comprised of two horizontal lines 98b and 98c for designating the position of the subject's head, a reference point 98e arranged on the center of the upper line of the inner boundary 98d and a reference line 98f for checking whether the subject's head is straight.

[0054]

When the image for ID photograph is selected from the second sub display area 39, the selected image 80 which is to be synthesized is displayed large in the main display area 37, as shown in Fig. 8 (B). The crop boundary 98 is displayed on the image 80 which is to be synthesized.

[0055]

The operator operates the mouse 27 to place the cursor 44 on the reference point 98e of the crop boundary 98, and then presses and holds down the button of the mouse 44. Then, the crop boundary 98 is attached to the cursor 44 and moved on the control screen 35 according to the movement of the mouse 27. Then, the operator operates the mouse 27 to place the reference point 98e of the crop boundary 98 at the top of the head of a

human subject 100 in the image 80 which is to be synthesized, and then releases the button of the mouse 27. In this way, the reference point 98e of the crop boundary 98 is positioned on the top of the head of the human subject 100, as shown in Fig. 9 (A).

[0056]

Next, the operator grabs the lower line 98c of the inner boundary 98d of the crop boundary 98 with the mouse 27 to move it up and down, and then brings the lower line 98c to align with the chin of the human subject 100, as shown in Fig. 9 (B). In this way, the vertical length of the inner boundary 98d is matched to the vertical length of the head of the human subject 100.

[0057]

When the lower line 98c of the crop boundary 98d is placed on the chin of the human subject 100, the outer boundary 98a of the crop boundary 98 is automatically enlarged or reduced in cooperation with the formation of the inner boundary 98d while keeping an equal aspect ratio to that of the inner boundary 98d. In this way, the crop boundary 98 is displayed on the image 80 which is to be synthesized in the main display area 37 such that the crop boundary 98 has a corresponding shape to the outline of the ID photograph 95 for the passport and the human subject 100 is arranged at proper position in proper size within the crop boundary 98, as shown in Fig. 2.

[0058]

After designating the cropping area with the crop boundary

98, the operator operates the pasting button 52 on the main control command display area 40. Then the image 80 which is to be synthesized, the image of the crop boundary 98 and image data of the template 93 are input to the image synthesizing section 24. The image synthesizing section 24 extracts image data of the cropping area of the image 80 which is to be synthesized, wherein the cropping area includes an area bounded with the crop boundary 98 and a border area of constant width around the crop boundary 98. The extracted image data is enlarged or reduced in accordance with the size of each frame 111 of a template 110, and then synthesized with the image data of the template 110 such that the cropped image is pasted in the respective frames 111, as shown in Fig. 10. The image data of the border area of constant width around the crop boundary 98 is also extracted, therefore the frame 111 having a size of "5 cm × 4 cm" is formed in the template image 110, and the size of the frame 111 is larger, in both length and width, as compared with the actual size, which is "4.5 cm × 3.5 cm".

[0059]

Next, the operation of the imaging system 10 according to the present embodiment will be described with referring to the flow chart of Fig. 10. Upon turning on the imaging system 10, the imaging software is automatically started up in the PASOKON 12. Any image is not displayed on the control screen 35 as well as on the main display area 37, the first sub display area 38 and the second sub display area 39 right after starting up the imaging system 10.

[0060]

The operator operates the mouse 27 or the control panel 28 to move the cursor 44 on the control screen 35 and clicks on the menu button 70 of the menu selection display area 43. The list of menu titles is displayed upon clicking so the operator selects one menu that is applicable for the job content from the list. For instance, the ID photograph producing mode is selected. Then, the selected mode is displayed on the menu button 70.

[0061]

Next, the operator clicks on the input selection button 71 of the menu selection display area 43. The list of the input devices is displayed upon clicking so the operator selects one image input device from the list. When the reflective scanner 14 is selected as the image input device, for instance, a list of kinds of originals (a list of color materials) for selecting the kind of the reflective original is displayed extending from the list of the image input devices. The operator selects the kind of the reflective original to input from the list of kinds of originals. For instance, a printed photograph is selected.

[0062]

When the reflective scanner 14 is selected by the input selection button 71, the input size button 72 becomes effective. The size of the reflective original which is to be scanned through the reflective scanner 14, that is, the scanning area is designated with the input size button 72.

[0063]

The print size button 73 of the menu selection display area 43 is operated for selecting the print size and the template. Upon clicking on the print size button 73 with the mouse 27, a list of recording paper sizes and templates is displayed. This list can be also displayed as icons on the main display area 37 of the control screen 35, as shown in Fig. 3. These icons are useful when the operator can not visualize the templates clearly when looking at the list.

[0064]

After deciding which template to use, the operator moves the cursor 44 with the mouse 27 to click on the icon of the selected template, for instance, on the icon 77a. Then, the icon 77a is displayed in the reversed color to clarify that it is currently selected. Upon re-clicking on the color reversed icon 77a, the use of the template shown as the icon 77a is confirmed and the layout image 46 of that template is displayed on the first sub display area 38. When another icon is clicked while the icon 77a is displayed in the reversed color, the icon 77a returns to the original color, and the newly selected icon is displayed in the reversed color.

[0065]

In the layout image 46 of the template, the frame to have an image pasted therein first is displayed in the reversed color. When the same image is pasted in all the frames of the template, all the frames are displayed in the reversed color.

[0066]

After the template is selected, the crop boundary 98 is

displayed on the main display area 37, as shown in Fig. 8 (A). The crop boundary 98 has a corresponding shape to the outline of the ID photograph, for instance the ID photograph for the passport, which is produced with the selected template.

[0067]

After completing the operation for the image input on the control screen 35, the operator places the reflective original on the reflective scanner 14 which is the image input device to be used. The reflective scanner 14 is a flatbed type scanner, therefore the operator opens a lid that covers a stage and places the reflective original at an appropriate position on the stage. The operator closes the lid to fix the position of the reflective original, and then the reflective scanner 14 gets ready for reading in the images.

[0068]

When the read-in button 51 of the main control command display area 40 is operated after placing the reflective original in the reflective scanner 14, the PASOKON 12 drives the reflective scanner 14 to read in the reflective original. Image data generated by reading in the reflective original through the reflective scanner 14 is taken into the PASOKON 12 through the SCSI interface 30, and then input to the image data converter 23 that has a color correction circuit and a gradation processing circuit.

[0069]

In the image data converter 23, the color correction circuit controls the color balance of the input image by carrying out

$\gamma$-correction on each RGB color signal of the image data with use of the coefficients that correspond to the reflective scanner 14. On determining the color balance, the spectral characteristic of the reflective scanner 14 is taken into consideration. The gradation processing circuit corrects gradation of the image data by applying LUTs which are prepared for the respective color materials read out through the reflective scanner 14. Accordingly, an appropriate gradation is acquired by printing with the printer 16. Additionally, after correcting the gradation, the gradation processing circuit converts the image data into the YMC form, and converted data is recorded on the RAM 20.

[0070]

The image data read out through the reflective scanner 14 and converted through the image data converter 23 is displayed as a thumbnail on the second sub display area 39 of the control screen 35. When a number of reflective originals are read out through the reflective scanner 14, or a number of image data are input from a memory card, three frames of thumbnail images are displayed at once on the second sub display area 39. A pair of arrow buttons 49 is displayed below the second sub display area 39. The operator can check all of the thumbnail images by scrolling the second sub display area 39 with the arrow buttons 49.

[0071]

By operating the second display interchange button 83 that is arranged between the main display area 37 and the second sub

display area 39, the displayed contents are interchanged between the main display area 37 and the second sub display area 39, as shown in Fig. 5. Thereby, the operator can view six thumbnails on the main display area 37 in a larger size than on the second sub display area 39.

[0072]

In order to select the image for synthesizing with the template among input image data, the operator clicks on the thumbnail image displayed on the main display area 37 or on the second sub display area 39 with the mouse 27. Then the margin of the clicked thumbnail image is displayed in the reversed color to indicate that this thumbnail is currently selected. By operating the selection button 51 of the main control command display area 40 in this condition, the thumbnail image in the reversed color is displayed in enlarged size as the image 80 which is to be synthesized on the main display area 37 and the crop boundary 98 that has previously been displayed on the main display area 37 is displayed on the image 80 which is to be synthesized, as shown in Fig. 8 (B).

[0073]

The operator operates the mouse 27 to grab the reference point 98e of the crop boundary 98 with the cursor 44 and moves the reference point 98e to the top of the head of the human subject 100 in the image 80 which is to be synthesized, as shown in Fig. 9 (A). Next, the operator grabs the lower line 98c of the inner boundary 98d of the crop boundary 98 with the mouse 27 to move it up and down, and then brings the lower line 98c

to align with the chin of the human subject 100, as shown in Fig. 9 (B). In this way, the vertical length of the inner boundary 98d is matched to the vertical length of the head of the human subject 100.

[0074]

The outer boundary 98a of the crop boundary 98 is automatically enlarged or reduced in cooperation with the formation of the inner boundary 98d while keeping an equal aspect ratio to that of the inner boundary 98d, and the human subject 100 of the image 80 which is to be synthesized is bounded at proper position in proper size with the crop boundary 98, as shown in Fig. 2. Accordingly, designating the cropping area for synthesizing with the template becomes remarkably easier as compared with the conventional imaging system.

[0075]

After designating the cropping area, the operator operates the pasting button 52 on the main control command display area 40. Then the image 80 which is to be synthesized, the image of the crop boundary 98 and the image data of the image 110 which corresponds to the template 93 are input to the image synthesizing section 24. The image synthesizing section 24 extracts image data of the cropping area of the image 80 which is to be synthesized, wherein the cropping area includes an area bounded with the crop boundary 98 and a border area of constant width around the crop boundary 98. The extracted image data is enlarged or reduced in accordance with the size of each frame 111 of a template 110, and then synthesized with the image data

of the template 110 such that the cropped image is pasted in the respective frames 111. In this way, the frame 111 having a size of "5 cm × 4 cm" is formed in the template image 110, and the size of the frame 111 is larger, in both length and width, as compared with the actual size of the outline of the ID photograph for the passport, which is "4.5 cm × 3.5 cm".

[0076]

After being synthesized, the cropped image is displayed on the respective flames of the layout image 46 of the template on the first sub display area 38 of the control screen 35. In order to check the layout image in an enlarged size, the operator operates the first display interchange button 82 with the mouse 27. Thereby, the displayed images are interchanged between the main display area 37 and the first sub display area 38, and then the layout image 46 of the template is displayed in an enlarged size on the main display area 37, as shown in Fig. 4.

[0077]

When there is no need for correction after confirming the conditions of the synthesized image, the image can be printed as indicated in the message display area 42 of Fig. 2. In order to carry out printing, first, the operator operates the print number button 75 in the menu selection display area 43 to designate the number of copies to print. The number of copies to print is designated by selecting a number from a list of numbers through the mouse 27, or by entering a number through the control panel 28. Secondly, the operator operates the print button 53 in the main control command display area 40. Thereby,

the image recorded on the RAM 20 is converted into print data, then input in the printer 16, then printed. The printer is for the heat-developing photosensitive material in this embodiment, therefore the synthesized template image 110 is recorded on a photosensitive material by three laser beams. After recording, the photosensitive material is laid on an image receiving material that is added to water, and then heated together so as to form a positive image on the image receiving material. Finally, the photosensitive material is removed from the image receiving material, and then the image receiving material having the image printed thereon is ejected from the printer 16 as an ID photograph 114.

[0078]

Although the present embodiment is described with respect to the case of producing the ID photographs for the passport, the present invention is also applicable to the cases of synthesizing images with template images for other kinds of ID photographs, or with template images for those other than ID photographs.

[0079]

As the file reader, data storage devices with large capacity, such as CD-ROM drive, MO disc drive and so on are also used besides the floppy disc drive.

[0080]

As the printer, digital printers which use ordinary silver halide photosensitive materials, ink-jet printers, color thermal printers, electronic photography type printers and so

on are also used besides the printers for the heat-developing photosensitive materials.

[0081]

In the present embodiment, ID photographs are produced by synthesizing images with templates. It is also possible to print a cropped area of an image on a recording paper without synthesizing it with a template. Moreover, it is also possible to synthesize images without using templates, by pasting a cropped area of an image in an appropriate position within a printing area that is defined in correspondence with a selected recording paper size and is displayed on the first sub display area.

[0082]

An embodiment in which any template is not used is as follows. In an image synthesizing method for synthesizing an image displayed on display means or a printing method for printing an image displayed on display means on recording paper, a crop boundary is displayed on an image which is to be synthesized, and is moved on the image which is to be synthesized to position its reference point on an appropriate point of the image which is to be synthesized. Thereafter, a crop boundary is enlarged or reduced around the reference point, while keeping a corresponding shape to the frame of the template image, so as to bound a synthesizing area of the image which is to be synthesized. Then, the image bounded with the crop boundary is cropped, and the cropped image is enlarged or reduced in accordance with a designated print size, and then synthesized

or printed.

[0083]

[EFFECT OF THE INVENTION]

As explained above, according to the image synthesizing method and an apparatus of the present invention, the area of the image to synthesize is designated with the crop boundary which is enlarged or reduced around the reference point while keeping a predetermined proportion of the crop boundary. Therefore, it is possible to synthesize image such that the image is arranged at proper position in proper size in the frame without certain skills or any trials.

[0084]

Furthermore, the crop boundary is comprised of an inner boundary and an outer boundary, and the inner boundary is enlarged or reduced according to the size of an image and the outer boundary is automatically enlarged or reduced in cooperation with the movement of the inner boundary. Therefore, it is possible to designate the cropping area while keeping an equal ratio between the size of the image to be bounded with the inner boundary and the size of the template's outline.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Figure 1]

A block diagram illustrating an imaging system according to an embodiment of the present invention.

[Figure 2]

An explanatory diagram illustrating a control screen of an image processing software.

[Figure 3]

An explanatory diagram illustrating a condition of the control screen when selecting templates.

[Figure 4]

An explanatory diagram illustrating a condition of the control screen when interchanging the display contents between a main display area and a first sub display area.

[Figure 5]

An explanatory diagram illustrating a condition of the control screen when interchanging the display contents between the main display area and a second sub display area.

[Figure 6]

An explanatory diagram illustrating examples of templates for ID photographs.

[Figure 7]

An explanatory diagram illustrating the ID photograph for the passport.

[Figure 8]

An explanatory diagram illustrating a condition of the main display area when selecting templates and the image which is to be synthesized.

[Figure 9]

An explanatory diagram illustrating a condition of the main display area when designating a cropping area.

[Figure 10]

A flow chart illustrating a sequence for producing an ID photograph.

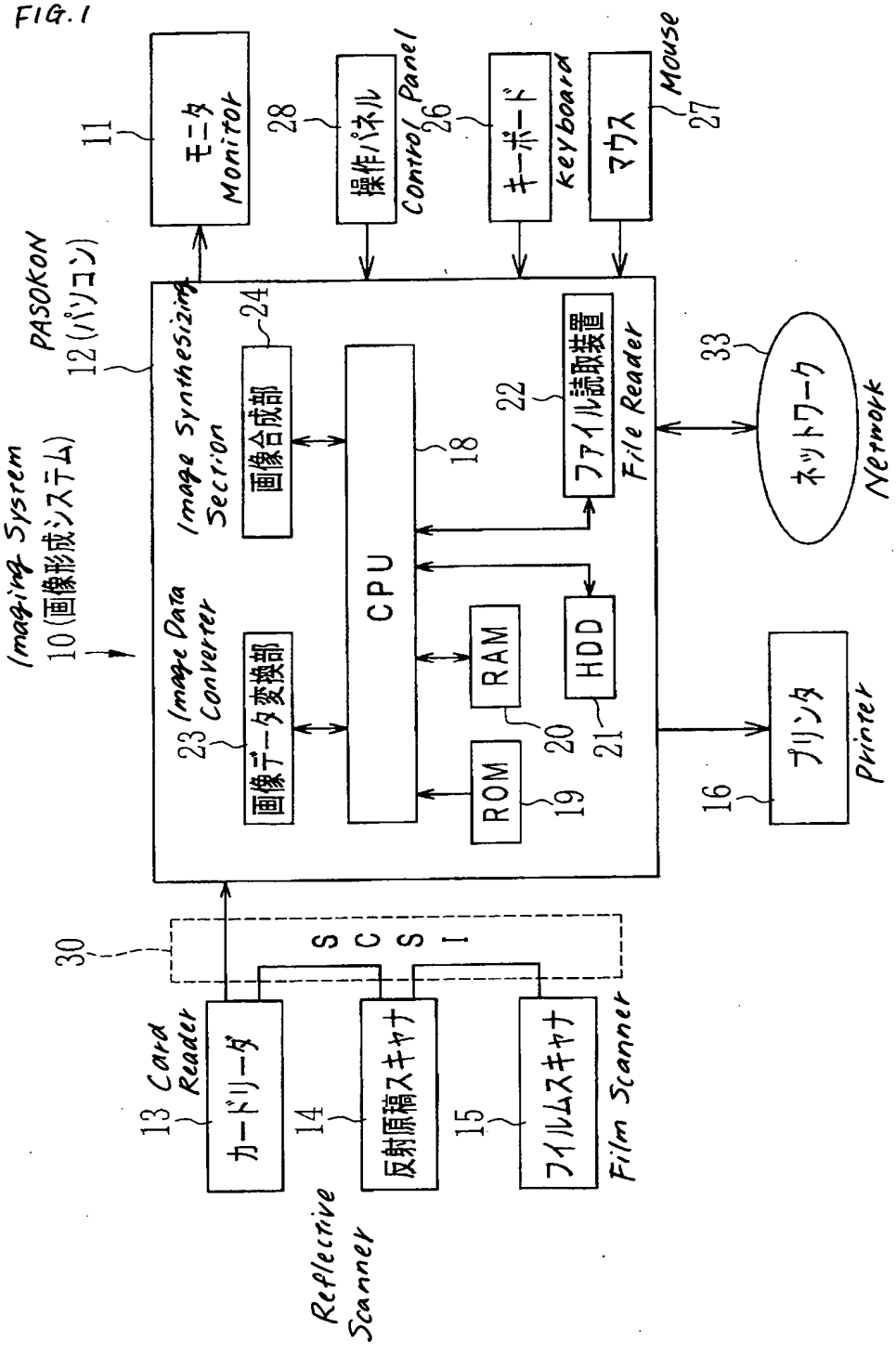
[DESCRIPTION OF THE REFERENCE NUMBERS]

| | |
|---|---|
| 10 | imaging system |
| 11 | monitor |
| 12 | PASOKON |
| 23 | image data converter |
| 24 | image synthesizing section |
| 27 | mouse |
| 28 | control panel |
| 35 | control screen |
| 37 | main display area |
| 38 | first sub display area |
| 39 | second sub display area |
| 80 | image which is to be synthesized |
| 98 | crop boundary |
| 98a | outer boundary |
| 98d | inner boundary 2 |
| 98e | reference point |
| 100 | human subject |
| 110 | template image |
| 111 | frame |
| 114 | ID photograph |

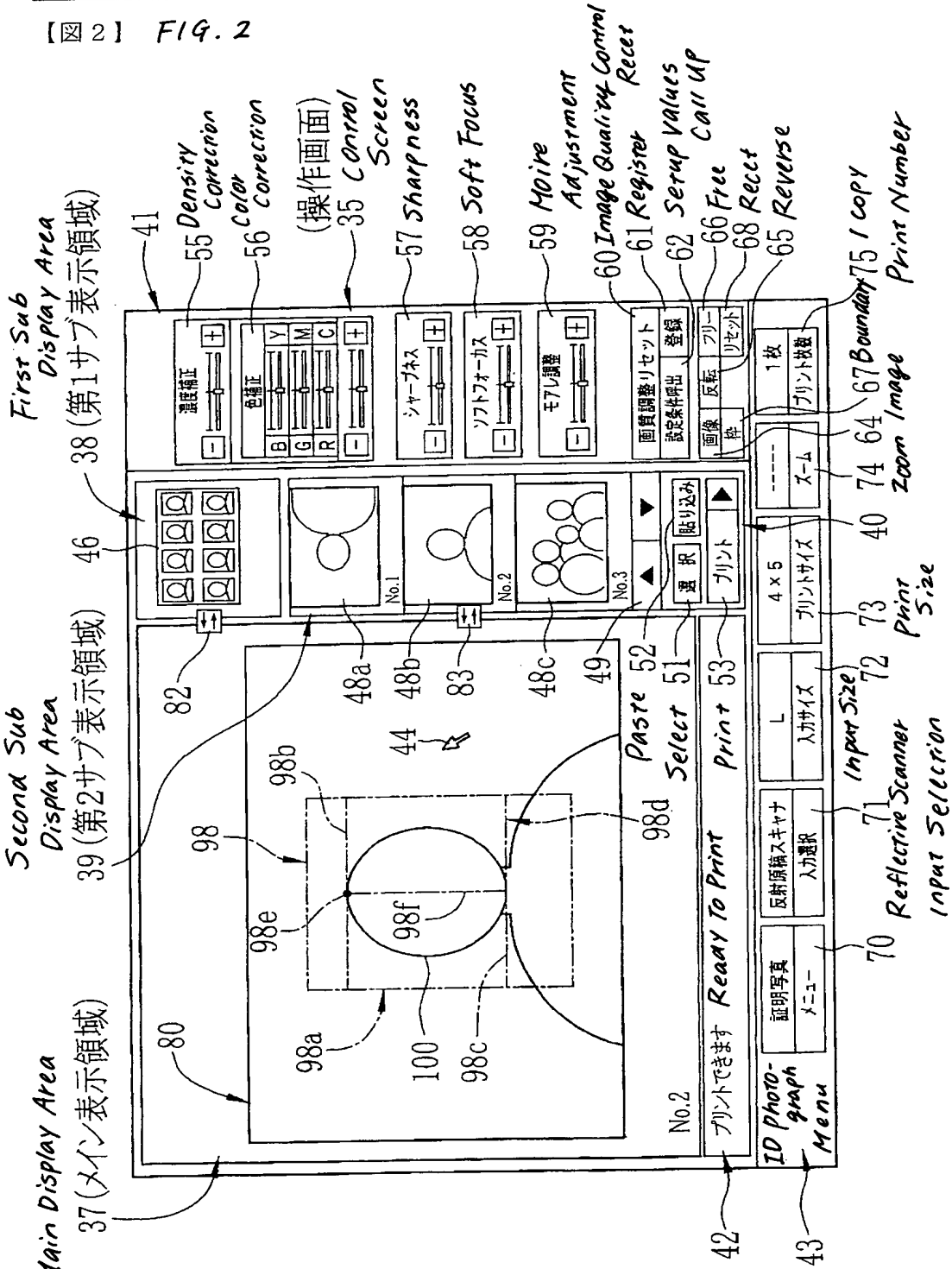
【書類名】　図面 Drawing

【図１】 Document Name

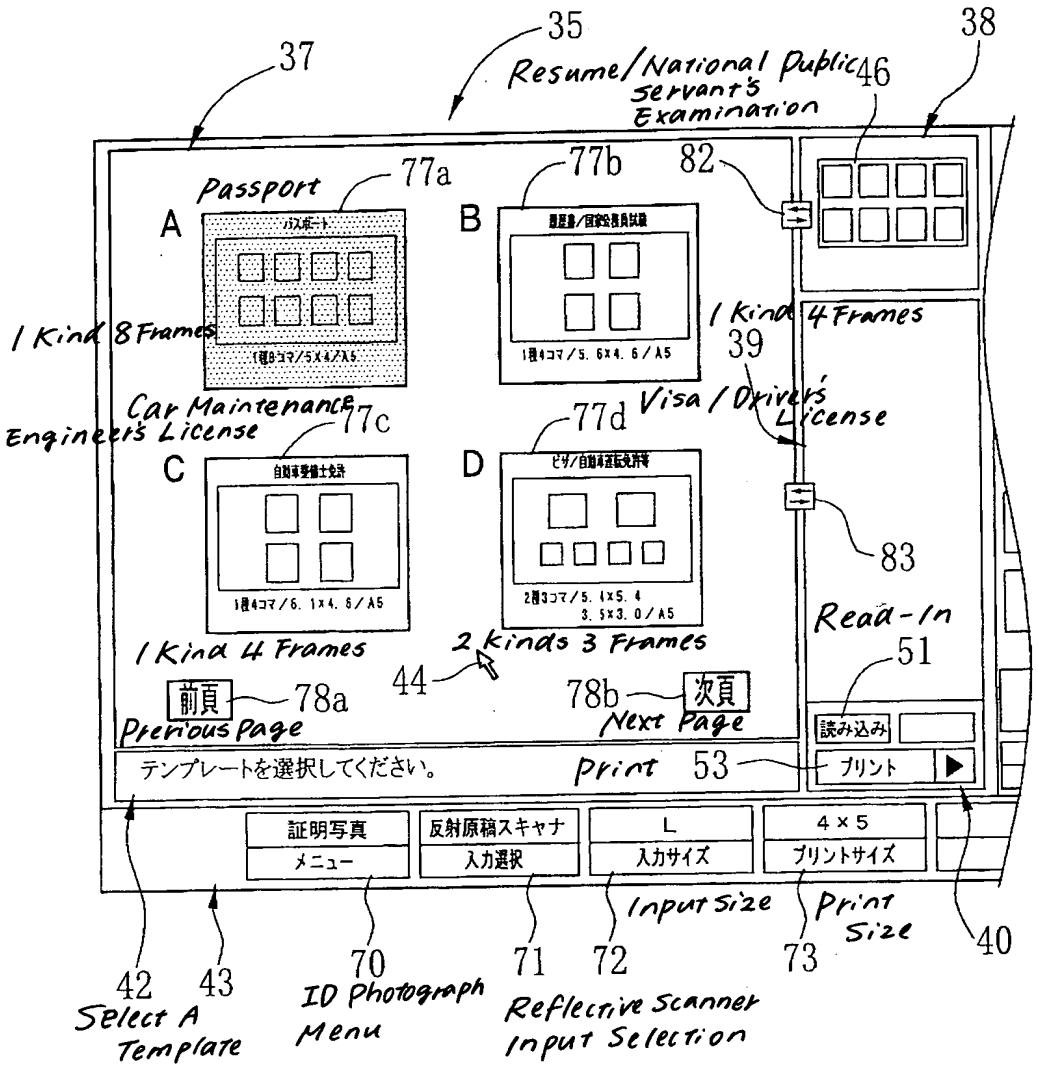
FIG.1



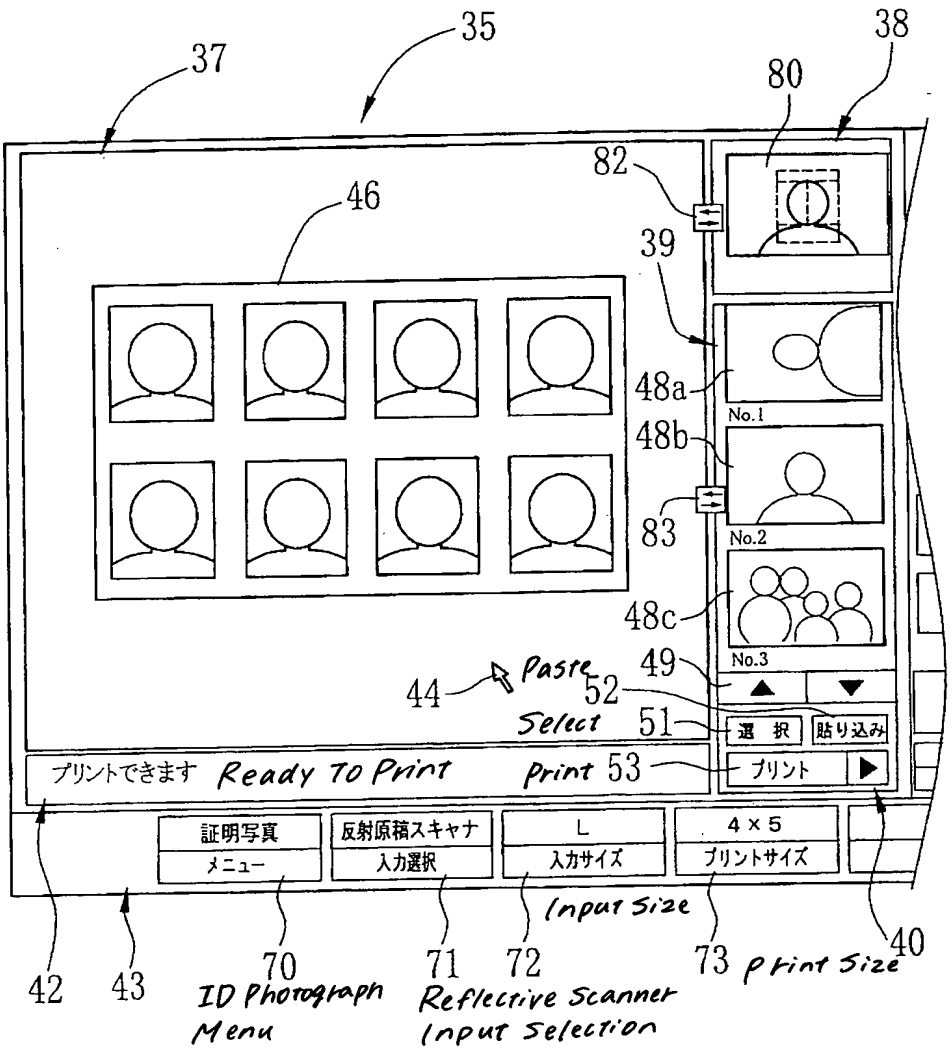
【図２】 FIG. 2


First Sub Display Area
(第1サブ表示領域)
Second Sub Display Area
(第2サブ表示領域)
Main Display Area
(メイン表示領域)
Density Correction
Color Correction
(操作画面)
Control Screen
Sharpness
Soft Focus
Moire Adjustment
Image Quality Control
Register
Setup Values Call UP
Free
Reset
Reverse
1 copy
Print Number
Boundary
Zoom Image
Print Size
Input Size
Reflective Scanner Input Selection
ID Photo-graph Menu
Ready to Print
Paste
Select
Print
No.1
No.2
No.3
濃度補正
色補正
シャープネス
ソフトフォーカス
モアレ調整
画質調整リセット
登録
設定条件呼出
画像枠
反転
フリーリセット
1枚
プリント枚数
ズーム
4×5
プリントサイズ
L
入力サイズ
貼り込み
選択
プリント
反射原稿スキャナ入力選択
証明写真
メニュー
プリントできます
41
55
56
35
57
58
59
60
61
62
66
68
65
75
67
64
74
40
73
72
71
70
46
38
39
37
82
48a
48b
83
48c
49
52
51
53
42
43
44
98
98a
98b
98c
98d
98e
98f
100
80

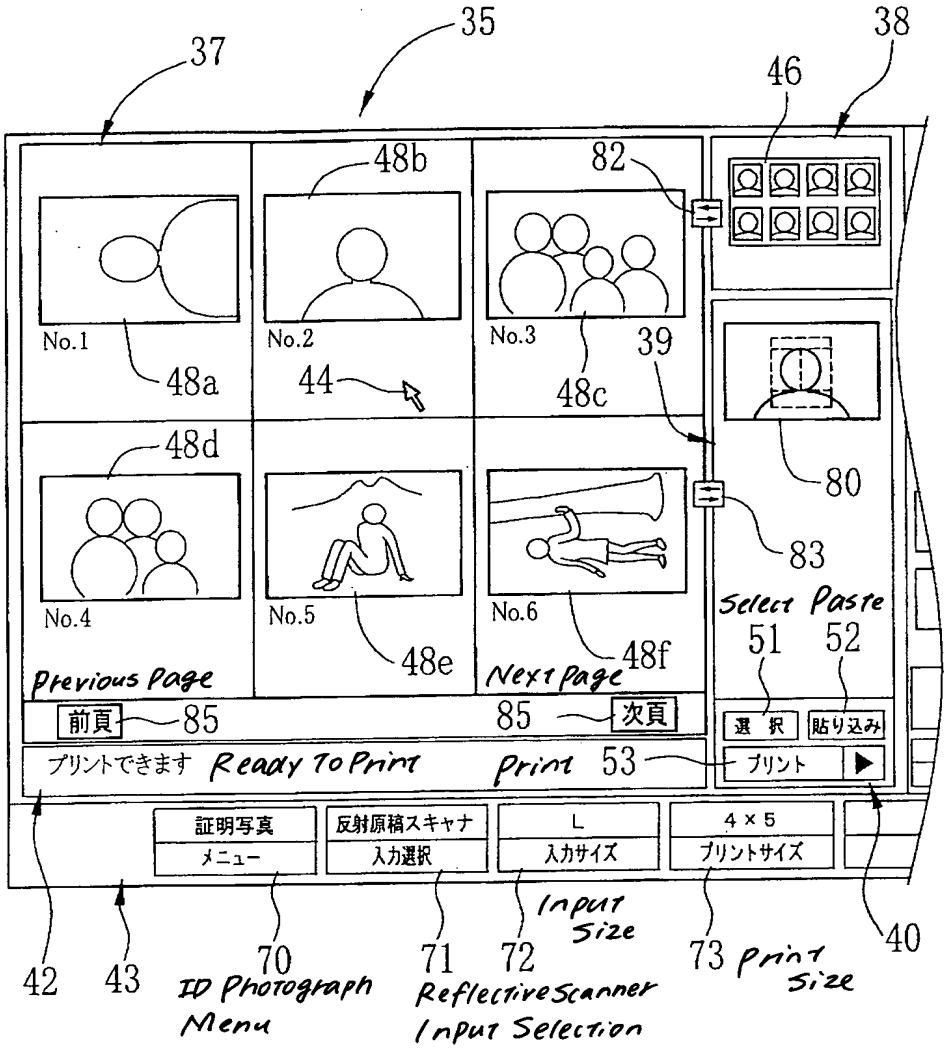
【図３】 FIG. 3


35
Resume/National Public Servant's Examination
37
38
46
Passport
77a
77b
82
A
B
1 Kind 8 Frames
1 Kind 4 Frames
39
Visa / Driver's License
Car Maintenance Engineer's License
77c
77d
C
D
83
Read-In
1 Kind 4 Frames
2 kinds 3 Frames
44
51
前頁
78a
78b
次頁
Previous Page
Next Page
読み込み
テンプレートを選択してください。
Print
53
プリント
証明写真
メニュー
反射原稿スキャナ
入力選択
L
入力サイズ
4×5
プリントサイズ
Input Size
Print Size
40
42
43
70
71
72
73
Select A Template
ID Photograph Menu
Reflective Scanner Input Selection

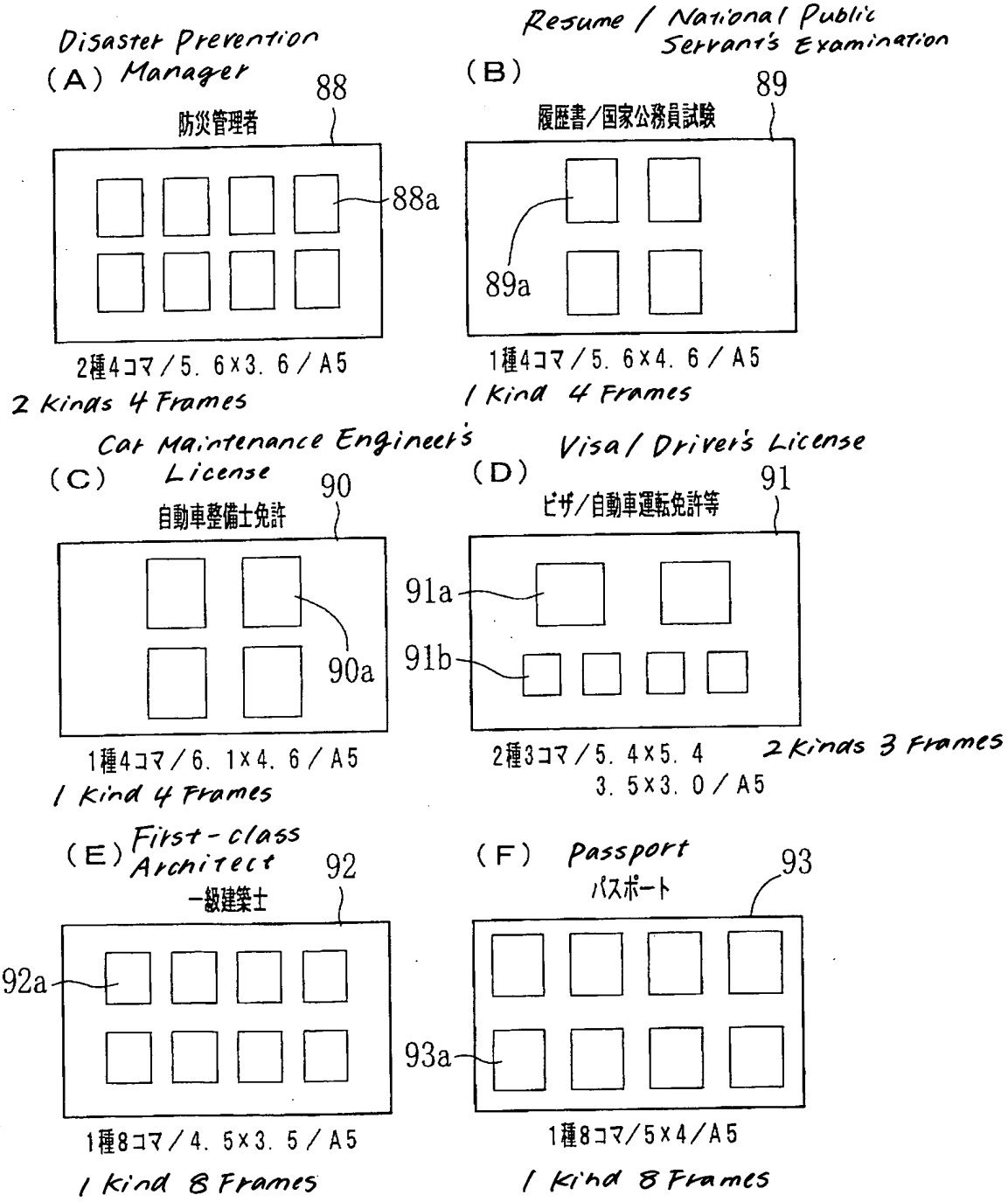
【図４】 FIG. 4


35
37
38
80
82
46
39
48a
No.1
48b
83
No.2
48c
No.3
49
44
Paste
52
Select
51
選　択
貼り込み
プリントできます
Ready To Print
Print 53
プリント
証明写真
メニュー
反射原稿スキャナ
入力選択
L
入力サイズ
4×5
プリントサイズ
Input Size
42
43
70
ID Photograph
Menu
71
72
Reflective Scanner
Input Selection
73
Print Size
40

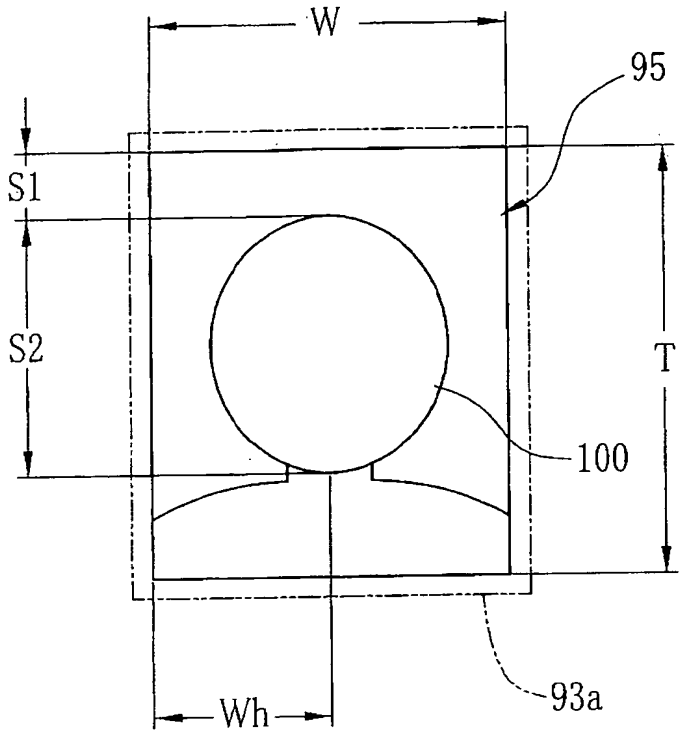
【図５】 FIG. 5


35
37
38
46
48b
82
No.1
No.2
No.3
48a
44
48c
39
48d
80
83
No.4
No.5
No.6
48e
48f
Select Paste
51
52
Previous Page
Next Page
前頁
85
85
次頁
選 択
貼り込み
プリントできます
Ready To Print
Print 53
プリント
証明写真
メニュー
反射原稿スキャナ
入力選択
L
入力サイズ
4×5
プリントサイズ
Input Size
42
43
70
71
72
73
40
ID Photograph Menu
Reflective Scanner Input Selection
Print Size

【図６】 FIG. 6

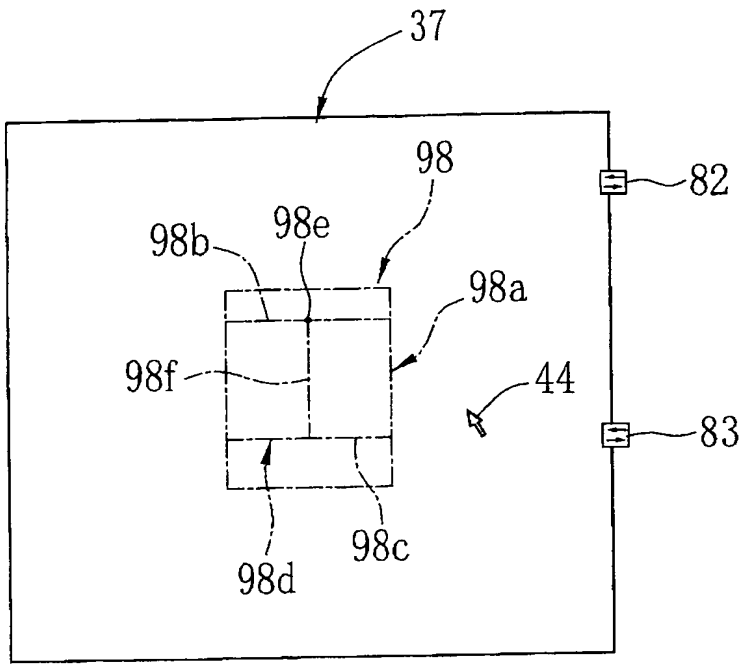

Disaster Prevention
(A) Manager
88
防災管理者
88a
2種4コマ／5．6×3．6／A5
2 Kinds 4 Frames
Resume / National Public Servant's Examination
(B)
89
履歴書／国家公務員試験
89a
1種4コマ／5．6×4．6／A5
1 Kind 4 Frames
Car Maintenance Engineer's License
(C)
90
自動車整備士免許
90a
1種4コマ／6．1×4．6／A5
1 Kind 4 Frames
Visa / Driver's License
(D)
91
ビザ／自動車運転免許等
91a
91b
2種3コマ／5．4×5．4
3．5×3．0／A5
2 Kinds 3 Frames
(E) First-class Architect
92
一級建築士
92a
1種8コマ／4．5×3．5／A5
1 Kind 8 Frames
(F) Passport
93
パスポート
93a
1種8コマ／5×4／A5
1 Kind 8 Frames

【図７】 FIG. 7

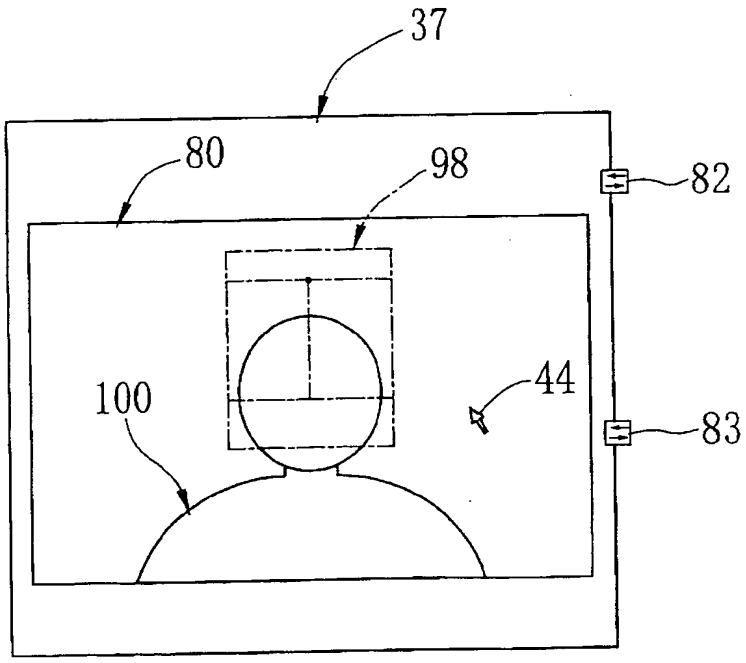


【図８】 FIG. 8

(A)

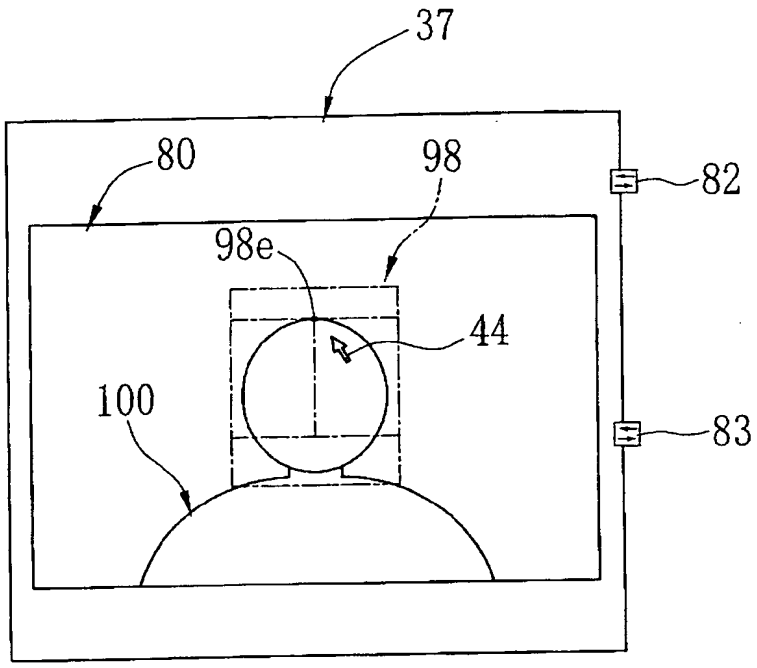



(B)

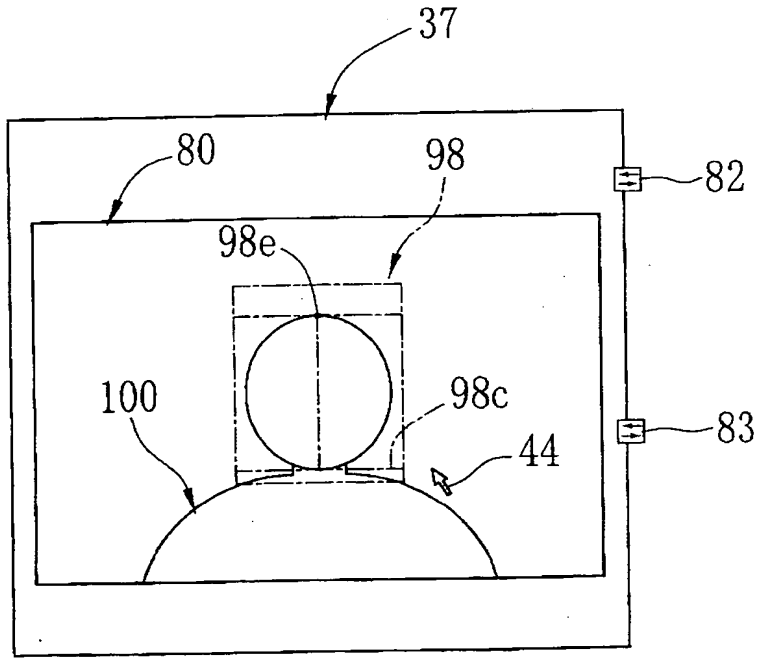


【図９】 FIG. 9

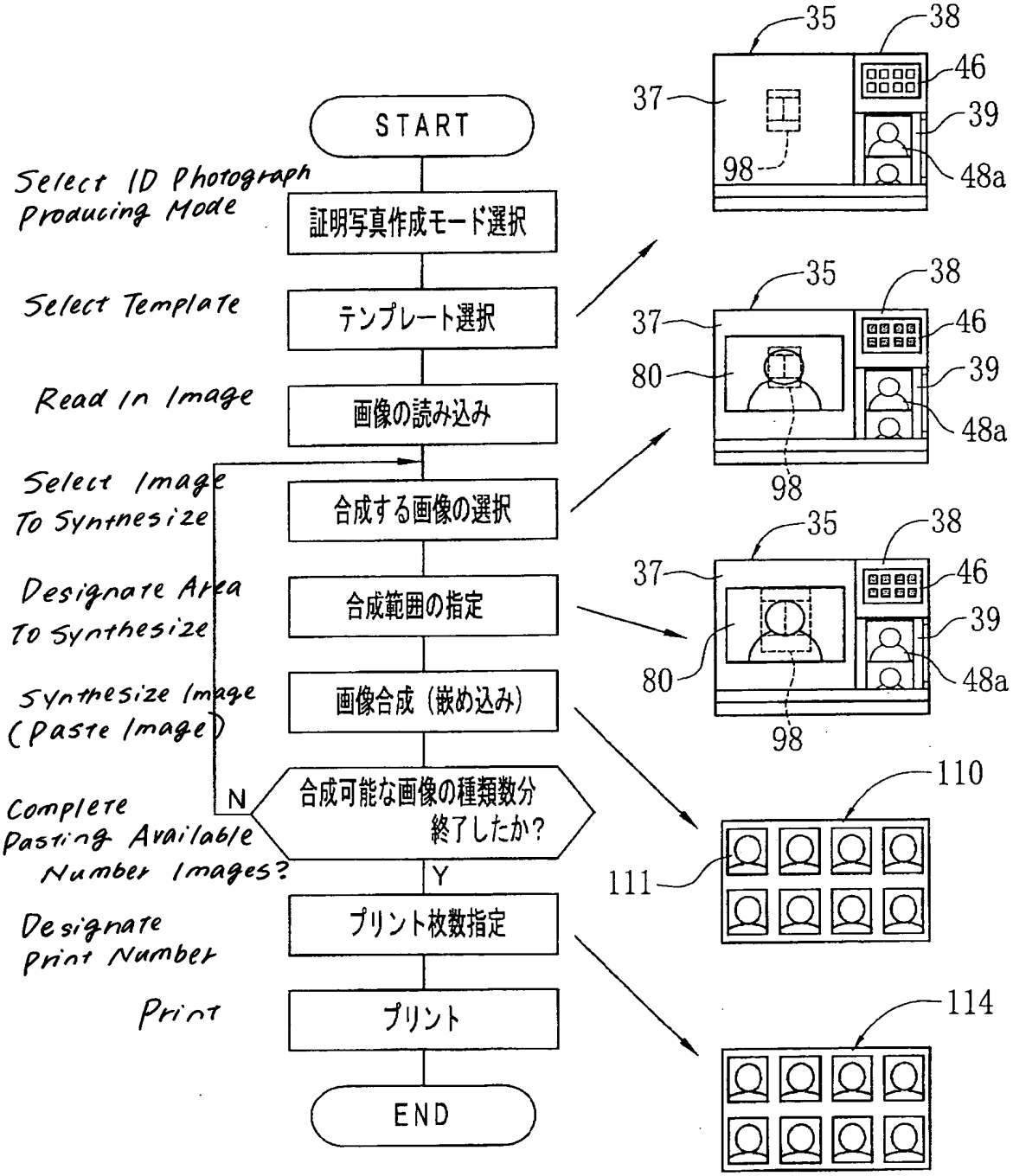
(A)




(B)



【図１０】 FIG. 10


START
Select ID Photograph Producing Mode
証明写真作成モード選択
Select Template
テンプレート選択
Read In Image
画像の読み込み
Select Image To Synthesize
合成する画像の選択
Designate Area To Synthesize
合成範囲の指定
Synthesize Image (Paste Image)
画像合成（嵌め込み）
Complete Pasting Available Number Images?
合成可能な画像の種類数分終了したか?
N
Y
Designate Print Number
プリント枚数指定
Print
プリント
END
35
38
46
37
39
98
48a
80
110
111
114

[TITLE OF DOCUMENT] Abstract

[ABSTRACT]

[OBJECT] To facilitate producing ID photographs which have regulations of the position and the size of an image in a frame.

[RESOLUTION] A crop boundary 98 is displayed on an image 80 which is to be synthesized. The crop boundary comprises an outer boundary 98a having a corresponding shape to the outline of a frame in a template image, an inner boundary 98d comprised of two horizontal lines 98b and 98c and a reference point 98e. The reference point 98e is placed on the top of the head of a human subject100 of the image 80 which is to be synthesized by moving the crop boundary 98. The horizontal line 98c is moved to align with the chin of the human subject 100 without moving the reference point 98e. The outer boundary 98a is enlarged around the reference point 98e in cooperation with the movement of the inner boundary 98d, while keeping an aspect ratio which is equal to that of the inner boundary, so as to designate the cropping area of the image for synthesizing with the template.

[ELECTED FIGURE] Figure 2